

Application No: 09/439,416
Filing Date: November 13, 1999
Group Art Unit: 2743
Examiner: D. Harvey
Atty. Docket No: 102316-3

REMARKS

The Office Action mailed April 3 had asserted a rejection under 35 U.S.C. 102(b) of both independent claims 1 and 12, based on Watkins '216.

Applicant's invention is a novel speaker construction and speaker coil wherein a voice coil comprises two or more wire coils, and the wire coils are directly connected in parallel with each other and layered on top of one another. The arrangement is unexpected. Magnetic field gaps suffer sharp drops in flux with increasing width, and there is no *a priori* or clearly expected benefit from such a construction.

Watkins shows a speaker having two coils through which the input signal flows, and in which one coil "is connected in series with a resonant circuit formed by an inductor 18 and a capacitor 20" (Watkins, col. 4, lines 17-18) and this resonant circuit, i.e., the series set of three elements, is connected across a voice coil (the primary, broad frequency response voice coil). In another embodiment, the primary voice coil of Watkins is also placed in series with an additional inductor and capacitor 24,22 so that two circuits are connected in parallel rather than a circuit and a voice coil. However, in neither case does Watkins teach or suggest two coils connected directly in parallel across each other as claimed by applicant.

It is well known that term "connected across each other" is an electrical term of art, referring to electrical connection of the coil ends. Furthermore, the requirement that such connection be "direct" rules out intervening assemblages of circuit elements. The Watkins reference neither teaches nor remotely suggests such a construction, and accordingly the rejection asserted in the Office Action of April 3, 2001 constitutes legal error and should be withdrawn.

The distinguishing language of applicant's claims is important.

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It will be understood that a loudspeaker motor relies on a stationary permanent magnet arranged such that the voice coil resides in a gap where a high magnetic field strength is focused. The voice coil is typically mounted to or carried by a diaphragm or speaker cone. The weight of the coil thus affects the mass and the resonance of the speaker; its dimensions affect the achievable height and width of the gap (hence the magnetic field strength in the gap), while the electrical characteristics determine its current capacity and other force- or performance-related properties. Thus, a great number of competing factors effect how much coil can be used without requiring a larger, lower flux gap or introducing excessive mass or other changes adversely affecting speaker performance or cost.

Applicant realized that by layering multiple wire windings about each other and connecting them directly in parallel, it was possible to achieve enhanced utilization of the magnetic gap to efficiently drive a speaker. As explained in the Disclosure at the bottom of page 7, using this construction a two layer directly parallel voice coil (as compared to a conventional two-layer but single winding coil), achieves one-quarter the resistance, hence four times the current in the same space. As compared to flat-wire winding (a conventional approach to raising the solid-conductor cross-section, hence increasing the current in a narrow gap) the parallel-coil arrangement may eliminate the wasted gap space of a return wire, and may have lower mass. As compared to a single-wire winding, the $B \times L \times I$ product may be increased over 40% with no change of diaphragm mass, enhancing drive power and field utilization. Thus, applicant's use of two or more layered coils in parallel is contrary to the accepted wisdom that the speaker performance degrades with increasing gap. Moreover, even greater current capacity, lower voltage operation or lesser height constructions may be achieved with applicant's construction using more than two layers.

Contrary to the assertion of the Office Action, the reference does not show two coils connected directly across each other; it only purports to show *a circuit* in parallel with *a coil*.

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The resonant circuit or circuits operate such that one coil with its circuit elements effectively conducts power when the drive is at a low frequency, while the other (for which such series circuit elements are optional) effectively conducts the drive power at medium and high frequencies. Thus, the arrangement is somewhat like a crossover network/conditioning circuit, and the two coils are not directly in parallel either with each other or with the drive lines. Thus, the rejection is clearly erroneous and should be withdrawn.

We note that requests were made to interview this case in May, and applicant's attorney expresses appreciation that the Examiner undertook to consider proposed amended language to address a potential new ground of rejection then raised by the Examiner. However, that new rejection has not been made of record, so no amendment is believed necessary.

In addition to the remarks above, Applicant's attorney has further reviewed the other references that were cited by the Examiner against several dependent claims. These patents do not supply the structure of applicant's claims 1 and 12 that is missing from the Watkins patent, and thus cannot teach or suggest the claimed invention, separately or together. For all of the foregoing reasons the rejections previously asserted against the independent claims have no application to the claims now presented, and the cited art thus does not affect the patentability of any of claims 1-22. This Response is believed to address all issues presented by the Office Action of April 3, 2001.

Accordingly, all claims are now believed to be clearly allowable. Applicant's attorney therefore respectfully traverses the rejections of all claims, and requests that the Examiner withdraw the rejection of claim 1, claim 12 and all claims dependent thereon, reconsider the application, reexamine the claims, and allow all claims at this time. In view of the time during which applicant's attorney sought to obtain a substantive interview to resolve or clarify any

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issues prior to July 3 and the pendency of this case, applicant further requests that in the event the Examiner deems an amendment necessary before allowability, that she telephone the below-signed attorney and provide an opportunity to address such issues.

We further confirm that pursuant to discussion on July 3, 2001 with S.P.E. Curtis Kuntz, a telephone discussion has been scheduled for Thursday, July 12, at 10 AM.

Respectfully submitted,

NUTTER, MCCLENNEN & FISH, LLP

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Michael I. Falkoff
Reg. No. 30,833
Attorney for Applicant

One International Place
Boston, MA 02110-2699
Tel: (617) 439-2879
Fax: (617) 310-9879